**IMPACT: International Journal of Research in Engineering & Technology (IMPACT: IJRET)**
**ISSN(E): 2321-8843; ISSN(P): 2347-4599**
**Vol. 2, Issue 11, Nov 2014, 1-6**


# EARTHWORM DISTRIBUTION WITH SPECIAL REFERENCE TO PHYSICOCHEMICAL PARAMETERS IN ALAND AND CHINCHOLI REGIONS, GULBARGA DISTRICT

**SHARANAPPA PADASHETTY & MURALI JADESH**

Department of Zoology, Gulbarga University, Gulbarga, Karnataka, India

## ABSTRACT

A preliminary survey of earthworm distribution with special reference to physico chemical parameters of soil studied from Feb 2013 to Jan 2014 in two regions i.e. Aland and Chincholi taluk. Five species of earthworms were identified belonging to three families namely lumbricidae, Octochaetidae, Megascolecidae. *Eisenia fetida* belonging to family lumbricidae, *Dichogaster bolaui* belong to family Octochaetidae, *Polypheretima elongate*, *Perionyx sansibaricus* and *Perionyx excavates* belong to family Megascolecidae.

**KEYWORDS:** Earthworms, Distribution, Aland, Chincholi, Physicochemical parameters

## INTRODUCTION

Earthworms, the member of class Oligochaeta in the phylum Annelida are one of the major macro fauna of soil. The Greek philosopher, Aristotle, named them the 'Intestine of Earth', but till now they are actually considered as the 'unheraled soliders of the soil'. Earthworms have great ability to improve soil structure, to breakdown organic matter and release plant nutrients (Edwards C. A. and Bohlen P. J. 1996). Around 4000 species of earthworms are known to occur globally and from India so far 418 species, referable to 67 genera and 10 families, have been reported **(**Kale R. 1991).

The earthworms are widely distributed throughout the world and their population contributes about 80 % of total biomass of the soil ecosystem. The distribution of Earthworms not only depends on physicochemical factors of the soil but also their reproductive potential and dispersive power (Edwards and Lofty 1997). The information on the ecology of earthworms from natural ecosystems of Indian tropics is limited (Bhadauria and Ramakrishnan 1991), however, there are some comprehensive faunastic studies on earthworms in India (e.g. Dash and Patra 1977, Bhadauria and Ramakrishnan 1991). These studies showed the influence of various edaphic factors; temperature, moisture, organic matter, *p*H etc. on the population of earthworms.

Earthworms are long thread-like, cylindrical, soft-bodied, segmented invertebrate worms with uniform ring-like structures all along the length of their body. They belong to class Clitellate of order Oligochaeta of phylum Annelida. Oligochaetes can be aquatic or terrestrial. The terrestrial Oligochaete belonging to 10 families and 1800 species of earthworms are distributed all over the world. The earthworms vary in size, colour and behavior. The soil, moisture content, salinity, temperature and the type of organic matter they like to feed and the depth to which they can go in the soil vary from species to species (Govindan, 1998).

The most important aspect of earthworm ecology is their feeding activity. Earthworms gain nutrition from the soil or leaf litter they ingest, extracting the organic matter, which includes root and leaf litter debris, and grinding it in their gizzard (Curry 1998). The waste they expel forms structures called casts. Their feeding and cast forming characteristics

significantly affect soil structure significantly (Edwards and Shiptalo 1998). As a result of their feeding and burrowing activity, earthworms (particularly endogeic and anecic worms) thoroughly mix organic and mineral components of the soil (Edwards and Shiptalo 1998).

The present study is to investigate the distribution of the earthworms in Aland and Chincholi regions correlating their distribution to physic-chemical factors of soils they inhabit.

## MATERIALS AND METHODS

The Study area includes two regions of Gulbarga district i.e. Aland and Chincholi taluk (Figure 1) (http://www.kssidc.kar.nic.in/karmap_files/gulbarga.jpg). Survey was conducted in the study area from Feb 2013 to Jan 2014.

Aland is located at 17.57°N 76.57°E. It has an average elevation of 480 metres (1574 feet). The town is spread over an area of 8 km². Summer Temp. 44 °C Winter Temp. 22°C. Chincholi is located at 17.47°N 77.43°E. It has an average elevation of 462 metres (1515 feet). The town is spread over an area of 6 km². (http://en.wikipedia.org/wiki/Aland, Chincholi, _Karnataka)

### Earthworm Sampling

Earthworms for the present taxonomic study were collected by digging and hand sorting method. Samples were taken from two study area, Aland and Chincholi taluk.

Habitat such as coconut plantation, vegetable garden, areca plantation, banana plantation, flowering gardens and few lentic and lotic water bodies have been selected for earthworm species collection. Sampling were done in triplicate using the quantitative modified hand sorting standard methods of surface 30x30cm area. Later, soil was excavated up to 30 cm depth in each sampling point and available earthworms were collected. Specimens were fixed in 30% alcohol for about 2 minutes for anesthetizing and then transferred to 10% formalin solution for permanent preservation. Earthworms were dissected out immediately after alcohol treatment to study the internal anatomical features for identification. The specimens were deposited in the department museum. Earthworms were identified with the help of monographs and other available literature on the subject (J. M. Julka, 1988). For statistical analysis six samples from each study area were taken and the statistical calculations such as arithmetic mean, standard deviation and standard error were made as described by Snedecor (1946).

Soil samples collected from various study sites were analyzed for soil texture by international Pipette method (Piper, 1966), moisture by oven drying method (Santhanam et al., 1989), pH by Digital meter (Mishra, 1968). Percentage of organic carbon (OC %), Phosphorus (P) kg/acre, Potash (K) kg/acre were measured in the Agriculture Soil Testing Centre, Gulbarga.

## RESULTS AND DISCUSSIONS

A total of five species of Earthworms have been recorded from the two study area. Five species of earthworms were identified belonging to three families namely lumbricidae, Octochaetidae, Megascolecidae and Eudrilidae. *Eisenia fetida* belonging to family lumbricidae, *Dichogaster bolaui* belong to family Octochaetidae, *Polypheretima elongate*, *Perionyx sansibaricus* and *Perionyx excavates* belong to family Megascolecidae (Table 1).

The study showed that the family Megascolecidae was dominant in all the habitats of the study area. This study also showed that the species *Polypheretima elongate* size ranges from 9.5 to 230 mm and *Dichogaster bolaui* is the smallest in the length, size ranges from 25 to 40 mm in length.

A number of ecological factors often inter-correlated, are known to play a vital role in the distribution and abundance of earthworms. The most important among them are temperature, moisture, organic matter and hydrogen ion concentration.

Results of the soil analysis show, the pH ranges from 7.9±0.09 to 8.0±0.11. Salts content varies from 0.27±0.02 to 0.83±0.09. OC ranged from 0.29±0.01 to 0.57±0.01. P kg/acre ranges between 11±1.01 to 12.88±0.4. K kg/acre varies from 201.6±12.30 to 217.0±41.08. Moisture content ranges from 70.3% to 83.5% (Table 2).

## CONCLUSIONS

In recent years, the diversity of Indian earthworms has been mainly studied by Julka (1988). He described the family Octochaetidae in the publication 'Fauna of India' providing illustrated descriptions of 154 taxa including 6 new genera and 16 species. The knowledge on the earthworm fauna of India has also been enriched by Julka and Senapati (1987), Senapati et al. (1990), Julka and Paliwal (1994) and Paliwal and Julka (2005). Present work, therefore, is an attempt in this direction and contributes to update our contemporary knowledge on the biodiversity of earthworms' resources in the study area.


**Figure 1: Study Area**

**Table 1: Checklist of Earthworms of Two Regions Aland and Chincholi**

| S. No | Family | Species |
|---|---|---|
| 1 | Lumbricidae | *Eisenia fetida* |
| 2 | Octochaetidae | *Dichogaster bolaui* |
| 3 | Megascolecidae | *Perionyx excavatus* |
| | | *Perionyx sansibaricus* |
| | | *Polypheretima elongata* |

**Table 2: Physicochemical Factors of Soil of Earthworm Habitats**

| Parameters | Habitat of Earthworms | |
|---|---|---|
| Soil factors | Aland | Chincholi |
| pH | 7.9±0.09 | 8.0±0.11 |
| Salt | 0.27±0.02 | 0.83±0.09 |
| OC% | 0.29±0.01 | 0.57±0.01 |
| P kg/acre phosphorus | 11±1.01 | 12.88±0.4 |
| K kg/acre potash | 201±12.30 | 217.0±41.08 |
| Moisture content of the soil | 70.3% | 83.5% |

## REFERENCES


1. Bhadauria T and Ramakrishnan P S 1991. Population dynamics of earthworms and their activity in forest ecosystems of north-east India; *J. Trop Ecol.* 7 305-318.
2. Curry J. P. 1998. Factors Affecting Earthworm Abundance in Soils. In Earthworm Ecology. Eds C. A. Edwards. CRC Press LLC, Boca Raton, Florida
3. Dash M C and Patra U C 1997. Density, biomass and energy budget of tropical earthworm population from a grassland site in Orissa. India; *Rev. Ecol. Biol. Sol.* 14 461-471.
4. Edward C. A. and Lofty J.R., Biology of Earthworms. Chapman and Hall, London, 175–178 (1977)
5. Edwards C. A. and Bohlen P.J., Biology and Ecology of Earthworms, 3rd ed. Chapman and Hall, London, 426 (1996)
6. Edwards W. M. and M. J. Shipitalo. 1998. Consequences of Earthworms in Agricultural Soils: Aggregation and Porosity. In Earthworm Ecology. Eds C. A. Edwards. CRC Press LLC, Boca Raton, Florida.
7. Govindan, V. S. (1998). Vermiculture and vermicomposting. In: Ecotechnology for Pollution Control and Environmental Management (Eds. R. K. Trivedy and Arvind Kumar). *Enviro Media*, Maharashtra: 49-57.
8. http://en.wikipedia.org/wiki/Aland,_Karnataka accessed 2014
9. http://en.wikipedia.org/wiki/Chincholi accessed 2014
10. http://www.kssidc.kar.nic.in/karmap_files/gulbarga.jpg accessed 2014
11. Julka JM, Paliwal R (1994). On a new species of Plutellus Perrier (Acanthodrilidae: Oligochaeta from Northwest Himalayas, India, *Indian. Res. Bull*. Punjab Univ. 44: 217-220.
12. Julka JM, Senapati BK (1987). Records of the Zoological Survey of India. Miscellaneous Publication. Occ. Pap. 92 Grafic Printall, Calcutta, India pp. 1-105
13. Julka, J. M. (1988). Fauna of India: *Megadrile Oligochaeta (earthworms). Haplotaxida: Lumbricina; Megadcolecidae; Octochaetidae, Zoological Survey of India*, Culcutta, 400pp.
14. Kale R., Vermiculture, Scope for new Biotechnology. Calcutta: *Zoological Survey of India*, (6) 122-176 (1991)
15. Misra R (1968). Ecology work book. Oxford and IBH publishing company, Calcutta. India

16. Paliwal R, Julka JM (2005). Checklist of earthworms of Western Himalaya, India. *Zoos Print J*. 20(9): 1972-1976.

17. Piper CS (1966). Soil and Plant Analysis. *Hans Publishers, Bombay* p. 368

18. Santhanam R, Velaycitham P, Jegatheesam (1989). A manual of Fresh water Ecology. *Daya Publishing House*, Delhi p. 134

19. Senapati BK, Julka JM, Dash MC (1990). On a new species of Lennogoster Gates (Octochaetidae: Oligochaeta) from *India. Rev. Ecol. Biol.* Soil 27: 467-470.